IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

NONPROVISIONAL PATENT APPLICATION

Title: VIRTUAL REALITY MUSICAL GLOVE SYSTEM

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## CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application Serial No. 60/441,500, filed on January 21, 2003, entitled VIRTUAL REALITY MUSICAL GLOVE SYSTEM

## TECHNICAL FIELD OF THE INVENTION

This invention relates generally to a sound effects device. More specifically, the present invention relates to a user controlled sound effects device that incorporates at least one transmitter and at least one receiver that permits the user to play a variety of musical sound effects which are stored in the device.

## BACKGROUND OF THE INVENTION

At the present time, there are a wide variety of sound effect devices designed within toys and the like. These sound effects are usually of poor quality and add to increase the cost of the toy. Furthermore, many toys are not equipped with sound effects. If a child possesses a

wide variety of toys (toy guns, dolls, space ships, cars, dinosaurs, figurines, etc.) not equipped with sound effects, the child must improvise by creating his/her own sound effects.

For example, there are many toys for sale in today's market, however, none of the prior art sound effect devices provide the user with the ability to alter the order of sounds in a toy's programmed list of sound effects. In other words, the toy is limited to the order of the sound effects contained inside the toy as provided by the manufacturer. Second, when a child plays with a toy that contains sound effects, it is often difficult and disruptive for the child to manually push buttons on the object and play at the same time. Prior art designs simply do not allow the user to control the sound effects while playing with the toy in a more natural, realistic, or coordinated manner. In addition, such toys do not help develop the child's hand-eye coordination. Another disadvantage of prior art designs is the relatively poor sound quality.

"Data" gloves have been proposed for use as input devices for computer systems. For example, there are data gloves that use fiber-optic flexion sensors to determine how much each finger on the glove is bent. Such gloves also use an ultrasonic position sensor and a mercury switch

orientation sensor mounted on the back-hand surface of the glove to determine the location of the glove and send this information to the computer used with the glove.

Other data gloves are designed to replace a computer keyboard. Such gloves used flex sensors and electrical contacts on the fingertips to determine static positions representing the characters of the alphabet or engage contacts on the fingertips to be used as an input device for a video game.

The data gloves can be used in virtual reality environments with varying degrees of complexity. By correlating the position of the hand and the shape of the hand as sensed by the sensors on the glove to the position, shape and assigned function of a virtual object within the virtual environment, the host computer can interpret hand positions as instructions to manipulate the objects. More simply, by sensing the shape of the hand, the host computer can interpret the input as commands to the host system.

In flex sensing gloves, the glove can sense whether the glove is bent or not, but cannot accurately sense the degree of bend. In general, glove flexion of the fingers has not been used for rate control because the sensing is too difficult and the feedback to the user is not sufficiently accurate for efficient control. Virtual environment

parameters such as the speed of flying have not generally been tied to the degree of the bend of a finger, and the firmness of grasp is not tied to how tightly a fist is made.

Additionally, methods of performing music on an electronic instrument are also known, and may typically be classified in either of three ways: (1) a method in which automatic chord progressions are generated by depression of a key or keys (for example, Cotton Jr., et al., U.S. Pat. No. 4,449,437), or by generating a suitable chord progression after a melody is given by a user (for example, Minamitaka, U.S. Pat. No. 5,218,153); (2) a method in which a plurality of note tables is used for MIDI note-identifying information, and is selected in response to a user command (for example, Hotz, U.S. Pat. No. 5,099,738); and (3) a method in which performance of music on an electronic instrument can be automated using an indication system (for example, Shaffer et al., U.S. Pat. No. 5,266,735).

The first method of musical performance involves generating pre-sequenced or preprogrammed accompaniment. This automatic method of musical performance lacks the creativity necessary to perform music with the freedom and expression of a trained musician. This method dictates a preprogrammed accompaniment without user-selectable modifications in real-time, and is therefore unduly limited.

The second method of musical performance does not allow for all of the various note groups and/or features needed to initiate quality performance, with little or no training.

Thus, a need exists for a toy virtual reality glove that permits a user to generate and perform a variety of quality musical sound effects in a free form manner while developing increased coordination skills.

## SUMMARY OF THE INVENTION

The present invention eliminates the above-mentioned needs for a toy virtual reality glove that permits a user to generate and perform a variety of quality musical sound effects in a free form manner while developing increased coordination skills

In accordance with the present invention, there is provided a virtual reality musical glove comprising a glove assembly having at least one signal actuator positioned in a first orientation; at least one transmitter mounted to the glove assembly and electrically connected to at least one signal-generating switch, the at least one signal-generating switch operatively engaged to the at least one signal actuator, wherein the at least one signal-generating switch generates a signal when at least one signal actuator moves from the first orientation to a second orientation; the at

least one transmitter and the at least one signal-generating switch electrically connected to a power source; a receiving assembly having at least one receiver to receive a signal generated by the at least one transmitter; and a sound generator to convert the electronic signal to a musical tone, electrically connected to the receiver.

BRIEF DESCRIPTION OF THE INVENTION

FIGURE 1 is a top view illustration of the glove assembly of the preferred embodiment of the present invention.

FIGURE 2 is a top view illustration of the present invention of FIGURE 1, with the housing opened.

FIGURES 3a, b, and c are side view illustrations of the actuating system shown in FIGURE 2.

FIGURE 4 is a bottom view of the receiving assembly of the preferred embodiment of the present invention.

FIGURE 5 is a front view of the receiving assembly of present invention of FIGURE 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Fig. 1, a portion of the preferred embodiment of the present invention is illustrated as glove assembly 10. Glove assembly 10 includes glove 12 and housing 16.

Glove 12 incorporates piping 14 for operatively engaging dual-slide signal actuators 38 (discussed below). Piping 14 is preferably constructed of a flexible material, including, but not limited to plastics, rubbers, polymers and the like. Piping 14 is movably secured to glove 12 by fastening members 34 and affixed to glove 12 at the fingertip end. Fastening members 34 are preferably hoop- or loop-shaped, thereby allowing piping 14 to move therethrough, and affixed to glove 12 at predetermined positions.

Glove 12 additionally provides for the securement of housing 16. Housing 16 displays various information to a user, such as mode, indicated by mode indicator 28, instrument, indicated by instrument indicator 30, and musical note, indicated by note indicator 32. Additionally, it is preferred that housing 16 incorporate a power adapter to supply power to a power source (such as power source 42 discussed below) for the purpose of recharging.

Referring now to Fig. 2, housing 16 contains power switch 20 to turn on or off the power supplied to glove assembly 10. Housing 16 further incorporates several selectors, including volume adjuster 22 for adjusting volume for the user, mode selector 24 for selecting a play mode, and instrument selector 26 for selecting an instrument, such

as keyboard, guitar, or drum. Preferably, the selectors are push-buttons, put can include any one of an array of similar devices known in the art.

Mode indicator 28, instrument indicator 30, and note indicator 32 of housing 16 are electrically connected to a circuit board 50 that positioned internally in housing 16. Circuit board 50 is electrically connected to power source 42, which is preferably a rechargeable battery. Power is supplied to circuit board 50 via power supply wires 43. Power source 42 can be recharged via electrical power supplied to power adapter 18, connected to circuit board 50, which supplies power to power source 42. Circuit board 50 is additionally electrically connected to volume adjuster 22, mode selector 24, and instrument selector 26. Furthermore, circuit board 50 incorporates signal-generating switches 44a and 44b, transmitter 46, and antenna 48 to assist in transmitting signals from transmitter 46, which is incorporated into glove 12.

Housing 16 preferably further contains at least one signal actuator 38, each signal actuator 38 having a first actuator 38a, a second actuator 38b, an actuator base member 38c, and a spring.

Referring now to Figs. 3a, 3b, and 3c, the preferred manner of signal generation is illustrated. Fig. 3a

illustrates system of the present invention in a resting state (no signal generation), i.e. a first orientation. In the resting state, it is shown that piping 14 is operatively engaged to actuator base member 38c of signal actuator 38. Actuator base member 38c is secured by a spring 40 to a projection 41 of housing 16, so as to permit actuator base member 38c to always return to its resting position. Additionally, first actuator 38a and second actuator 38b are preferably positioned adjacent to signal-generating switches 44a and 44b, respectively.

As is illustrated in Fig. 3b, as the motion of the user's finger pulls piping 14, actuator base member 38c is pulled towards the fingertip end of glove 12, i.e. a second orientation. In doing so, the motion of actuator base member 38c results in a movement of second actuator 38b that results in contact between second actuator 38b and signal-generating switch 44b. The contact between second actuator 38b and signal-generating switch 44b causes an electrical signal indicative of a first musical note to be sent to transmitter 46.

As is illustrated in Fig. 3c, as the motion of the user's finger further pulls piping 14, actuator base member 38c is pulled even more towards the fingertip end of glove 12, i.e. a third orientation. In doing so, the motion of

actuator base member 38c results in a movement of first actuator 38a that results in contact between first actuator 38a and signal-generating switch 44a. The contact between first actuator 38a and signal-generating switch 44a causes an electrical signal indicative of a second musical note to be sent to transmitter 46.

Referring now to Fig. 4, receiving assembly 52 is illustrated. Receiving assembly 52 includes housing 54 that incorporates clip 56 for attachment to a user. As is shown in Fig. 4, housing 54 can include compartments 58 for housing additional sources of electrical power, such as batteries. Receiving assembly 52 further includes a speaker to output signals received by receiving assembly 52 from glove assembly 10 as musical tones.

Receiving assembly 52, as illustrated in Fig. 5, incorporates a power switch for controlling the flow of electrical power from the sources of electrical power through receiving assembly 52, a mode selector 64 to allow the user to select between various modes of operation, and an indicator 70 to provide the user with information relating to the operation of receiving assembly 52. Such information can include, but is not limited to, the presence of electrical power flowing through the system of receiving assembly 52. Additionally, receiving assembly further

includes an audio adapter 66 to output the received signals from glove assembly 10 to another device, such as a stereo or other music playing device, and a headphone adapter 68 to allow the user to hear the musical notes generated by receiving assembly 52 without disturbing others in the area around the user.

Signals generated by transmitter 46 of glove assembly 10 are received by receiving assembly 52, preferably at an antenna, such as antenna 72. Antenna 72 is electrically connected to a receiver (not shown) as is well known in the art, which is tuned to receive signals at the predetermined frequency of transmitter 46. The received signals are then processed by a signal processor, as is also well known in the art, and output to speaker 60 (or audio adapter 66 or headphone adapter 68) to produce the musical notes indicative of the signals generated by transmitter 46.

In operation, the user places at least one glove assembly 10 on his or her hand. Receiving assembly 52 is placed on the user as well, preferably by way of clip 56; however it is contemplated that glove assembly 10 and receiving assembly 52 may be incorporated into a single unit without departing from the present invention.

The user then ensures that the power to both glove assembly 10 and receiving assembly 52 is turned "on." The

user can then perform finger movements (such as playing an "air guitar") to create musical notes heard through receiving assembly 52. As discussed above with reference to Figs. 3b and 3c, the motion of the user's fingers pulls piping 14, thereby causing actuator base member 38c to be pulled towards the fingertip end of glove 12, i.e. the second orientation. In doing so, the motion of actuator base member 38c results in a movement of either or both of first and/or second actuators 38a and 38b that results in contact between either or both of first and/or second actuators 38a and 38b and signal-generating switches 44a and 44b. The contact between actuators 38a and 38b and signal-generating switches 44a and 44b causes an electrical signal indicative of musical notes to be sent to transmitter 46.

Transmitter 46 the outputs the signals generated by signal-generating switches 44a and 44b, preferably via radio-frequency signal, through antenna 48 to receiving assembly 52. Although radio-frequency signals are preferred, it is contemplated that the signals can be propagated to receiving assembly 52 by infrared signals, direct wiring, or other manner known in the art.

Receiving assembly 52 receives the signal transmitted by transmitter 46, preferably at antenna 72. Antenna 72 propagates the signal to a receiver, the receiver then

outputs the signals for processing by a signal processor, as is also well known in the art, which then outputs the signals to speaker 60 (or audio adapter 66 or headphone adapter 68) to produce the musical notes indicative of the signals produced by the movements of the user.

Although only a few exemplary embodiments of the present invention have been described in detail above, those skilled in the art will readily appreciate that numerous modifications are to the exemplary embodiments are possible without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention as defined in the following claims.